

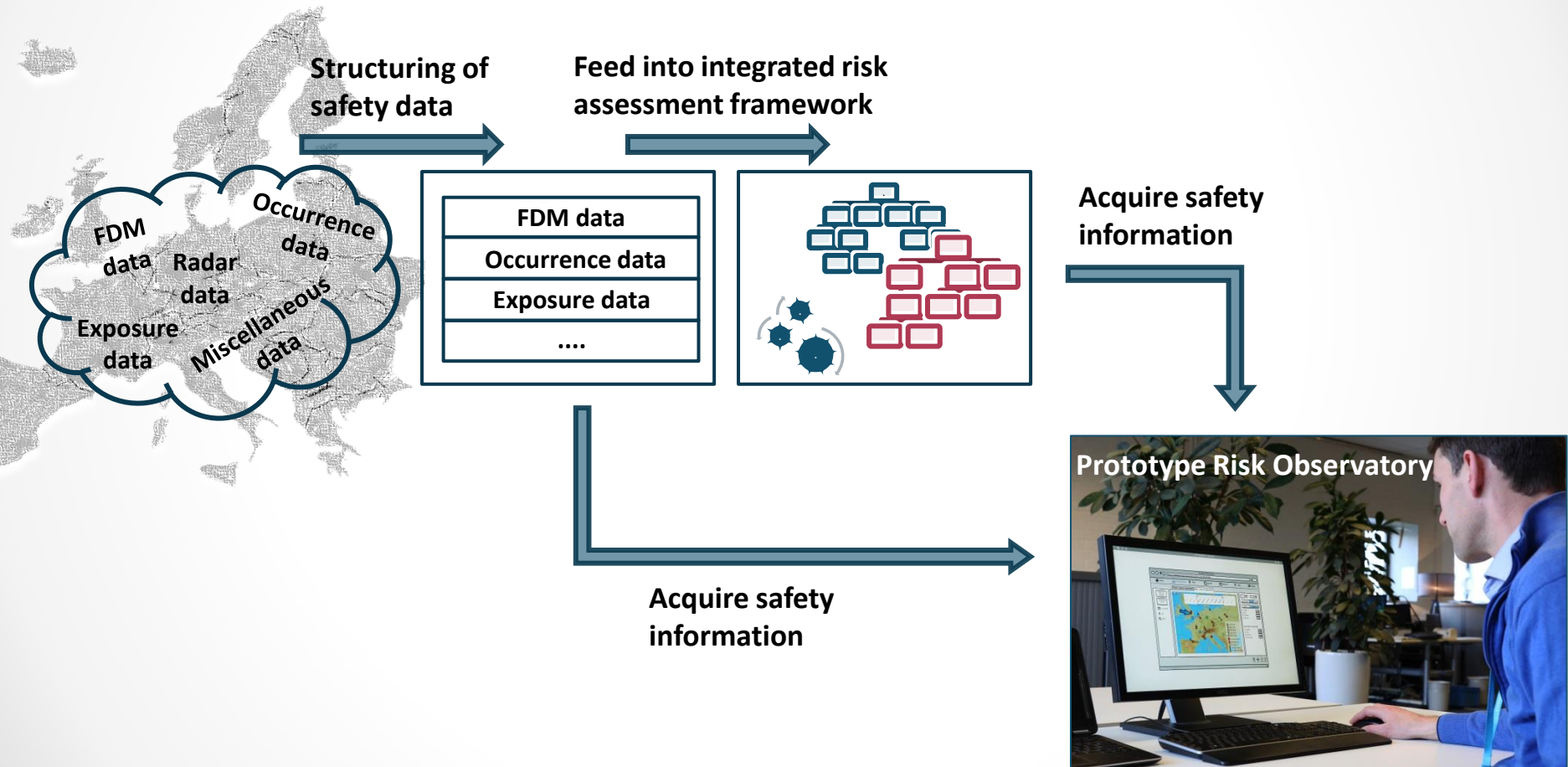
The Risk Observatory

Strengthening the ability to monitor safety performance



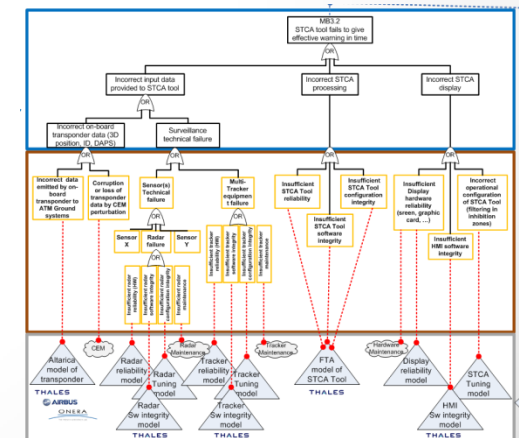
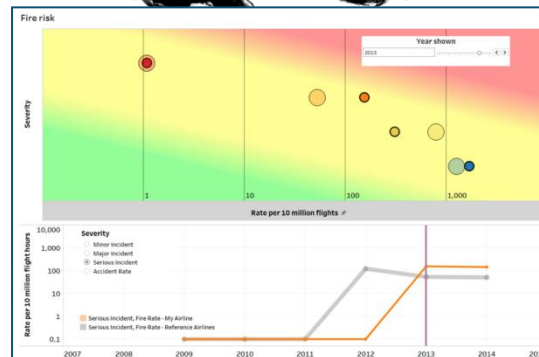
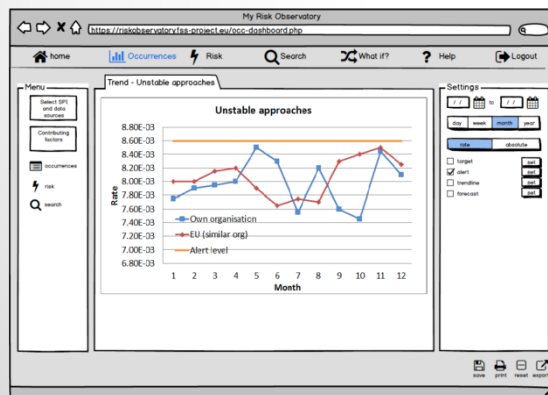
Gerben van Baren
vanbaren@nlr.nl

Introducing the Risk Observatory

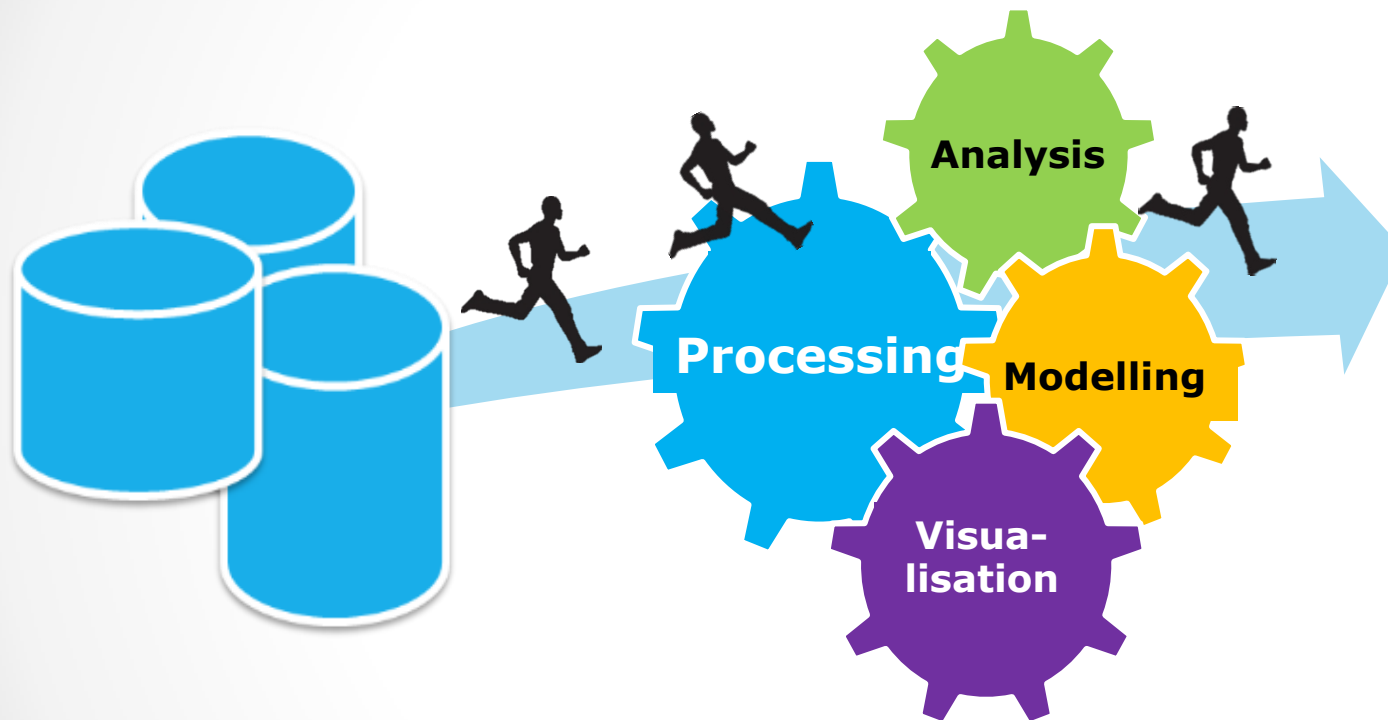


“We would like to prioritise hazards”

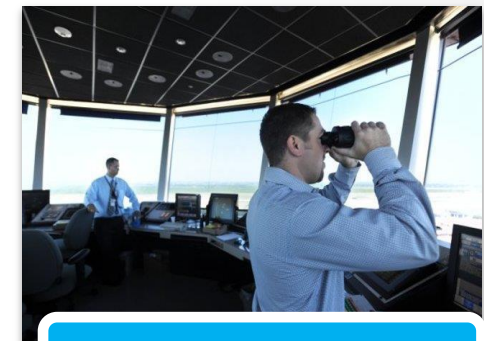
“Ensure interfaces are working together effectively”



From (big) data to information



Monitoring



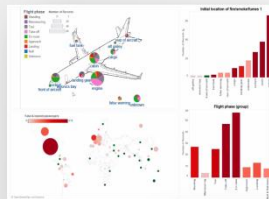
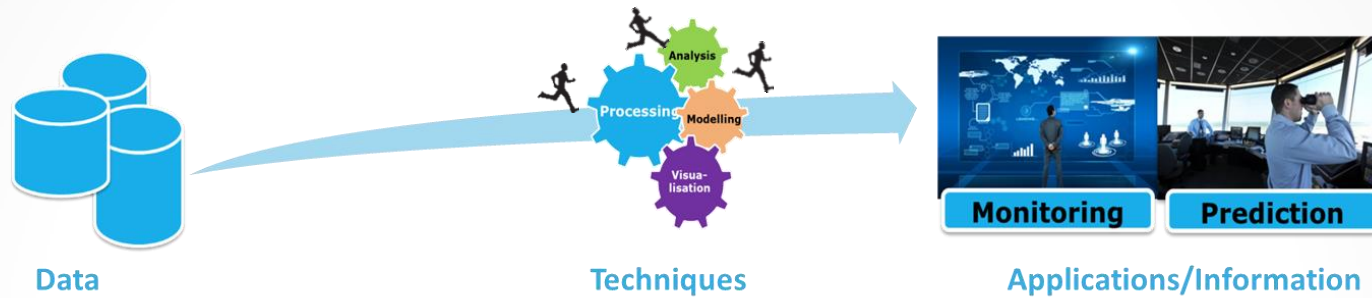
Prediction

Data

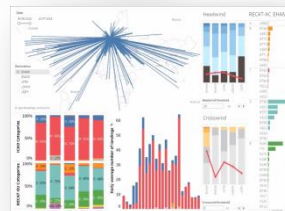
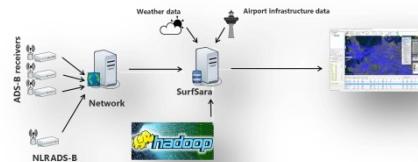
Techniques

**Applications/
Information**

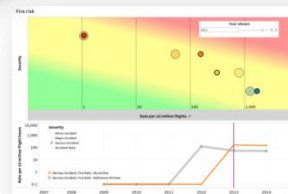
Example research activities



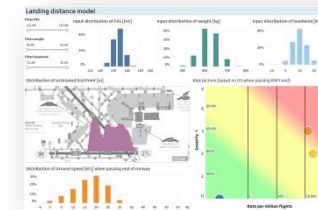
Occurrence data



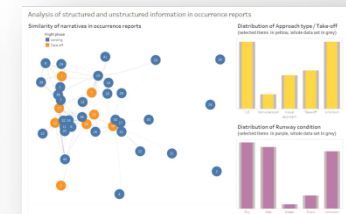
Exposure data



Risk modelling



Prediction

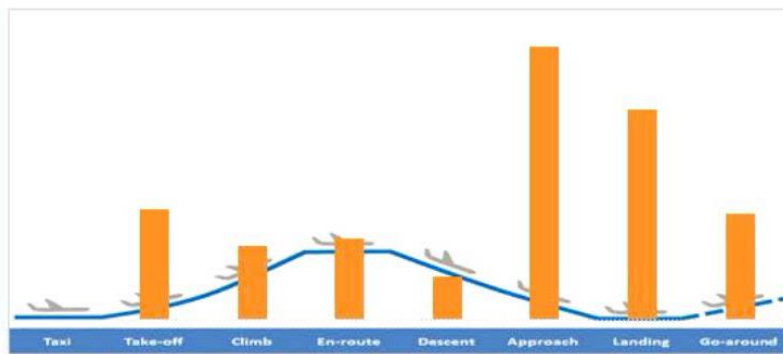


Text mining

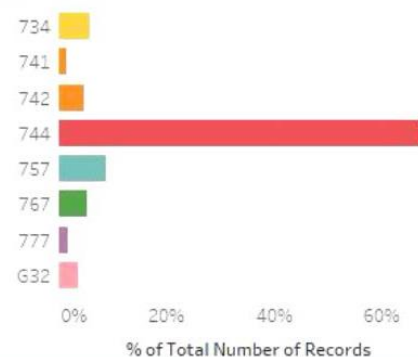
Analysis / visualisation of FDM data

FDM Dashboard

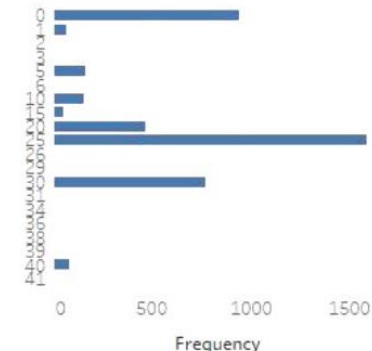
Flight phases



A/C Type

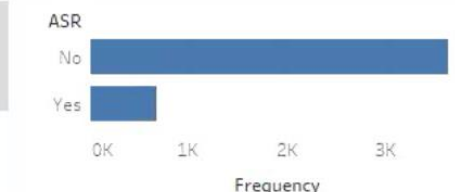


Flap setting

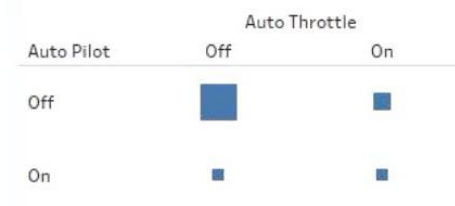


Description	January	February	March	April	May	June	July	August	Septem..	October	Novem..	Decemb..
Deep Landing												
Deviation Above Glideslope (Below ...												
Reduced Lift Margin Except Near G..												
Altitude deviation												
TCAS . Resolution Advisory												
Go around from below 1000 ft.												
Flap Placard Speed Exceedence												
GPWS Soft Warning												
High Energy at 1000'												
Go Around from below 1000ft												
Stick Shake												
High Normal Acceleration on Ground												
High Energy (knots equivalent) at 5..												
Abnormal Configuration. Speed Bra..												
Approach Speed High Below 25 ft A..												
Go Around from above 1000ft												
Rotate rate high												
Mmo Exceedence												

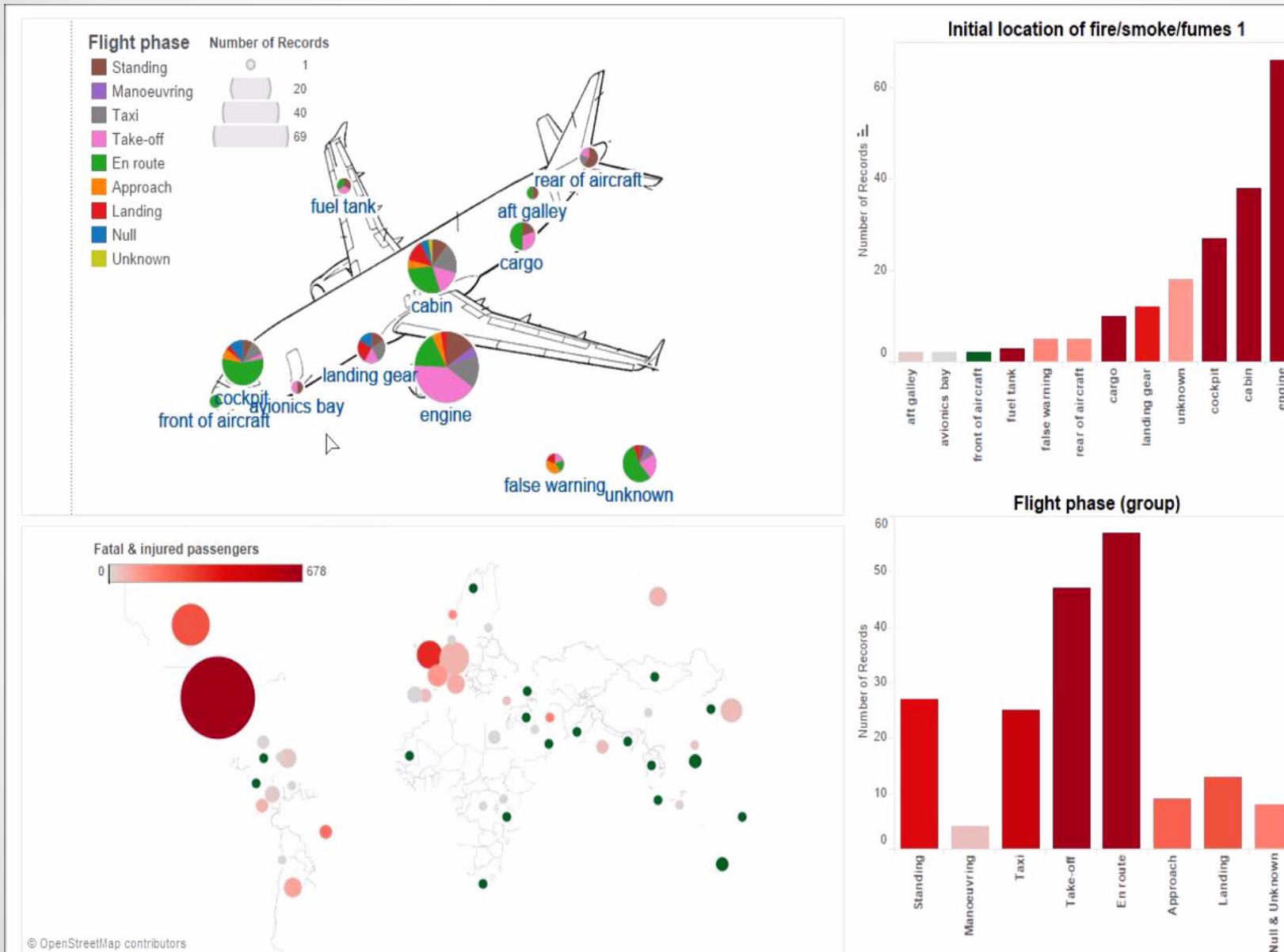
ASR submitted



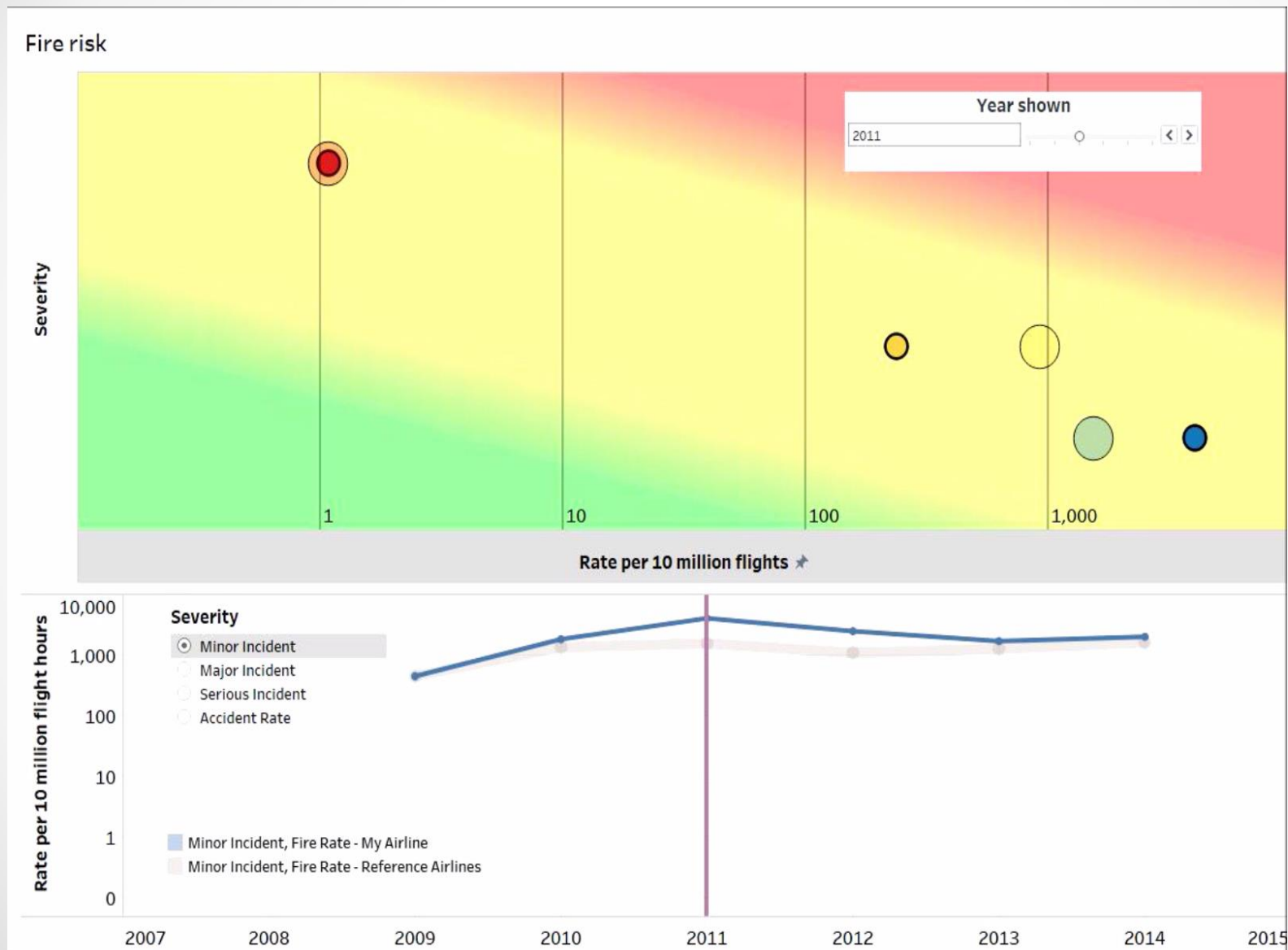
Auto Pilot/Auto Throttle



Analysis / visualisation of occurrence data

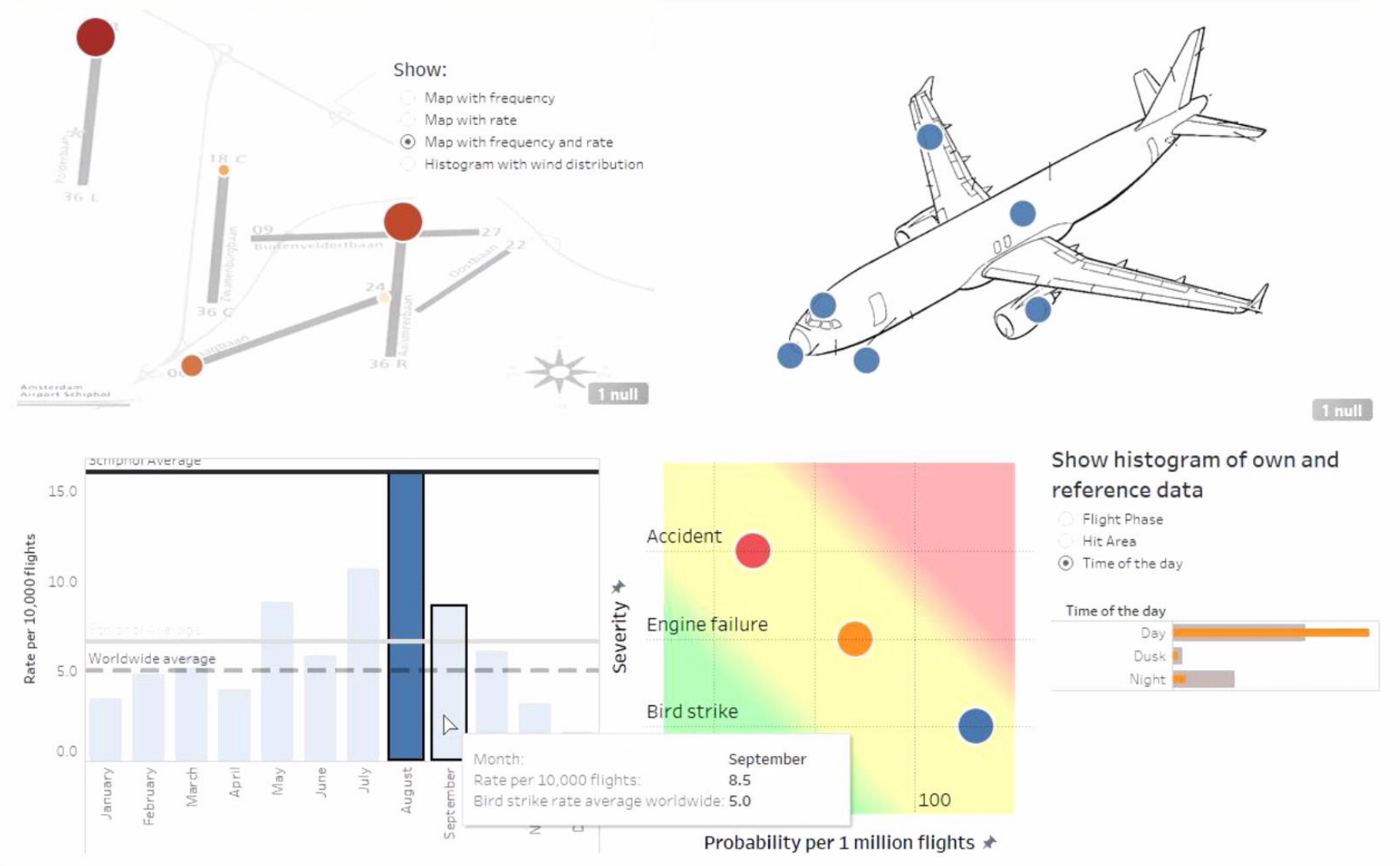


Data and risk modelling, Risk picture, blind comparison



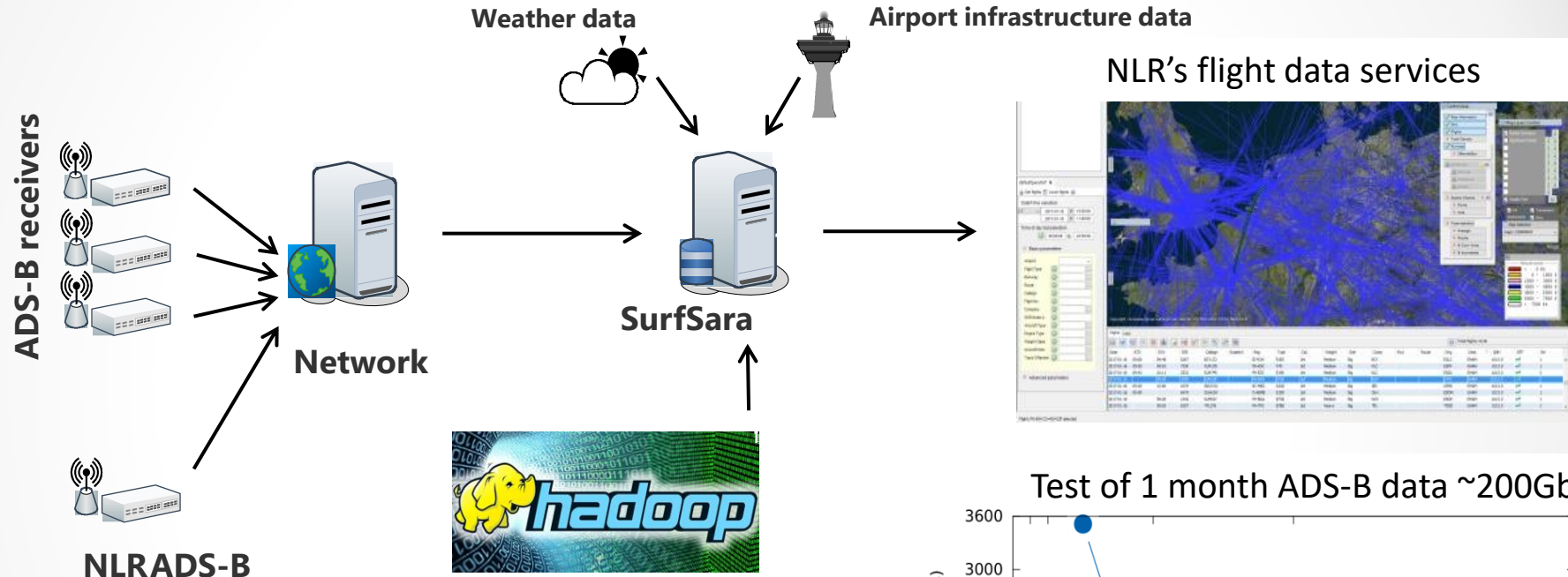
Visualisation + risk modelling of occurrence data

Bird strike occurrence dashboard



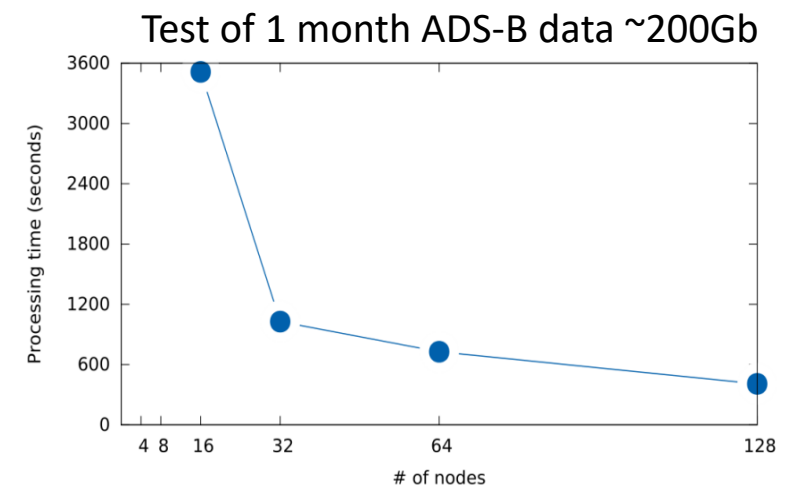
Exposure data

Processing 10,000 flights per hour

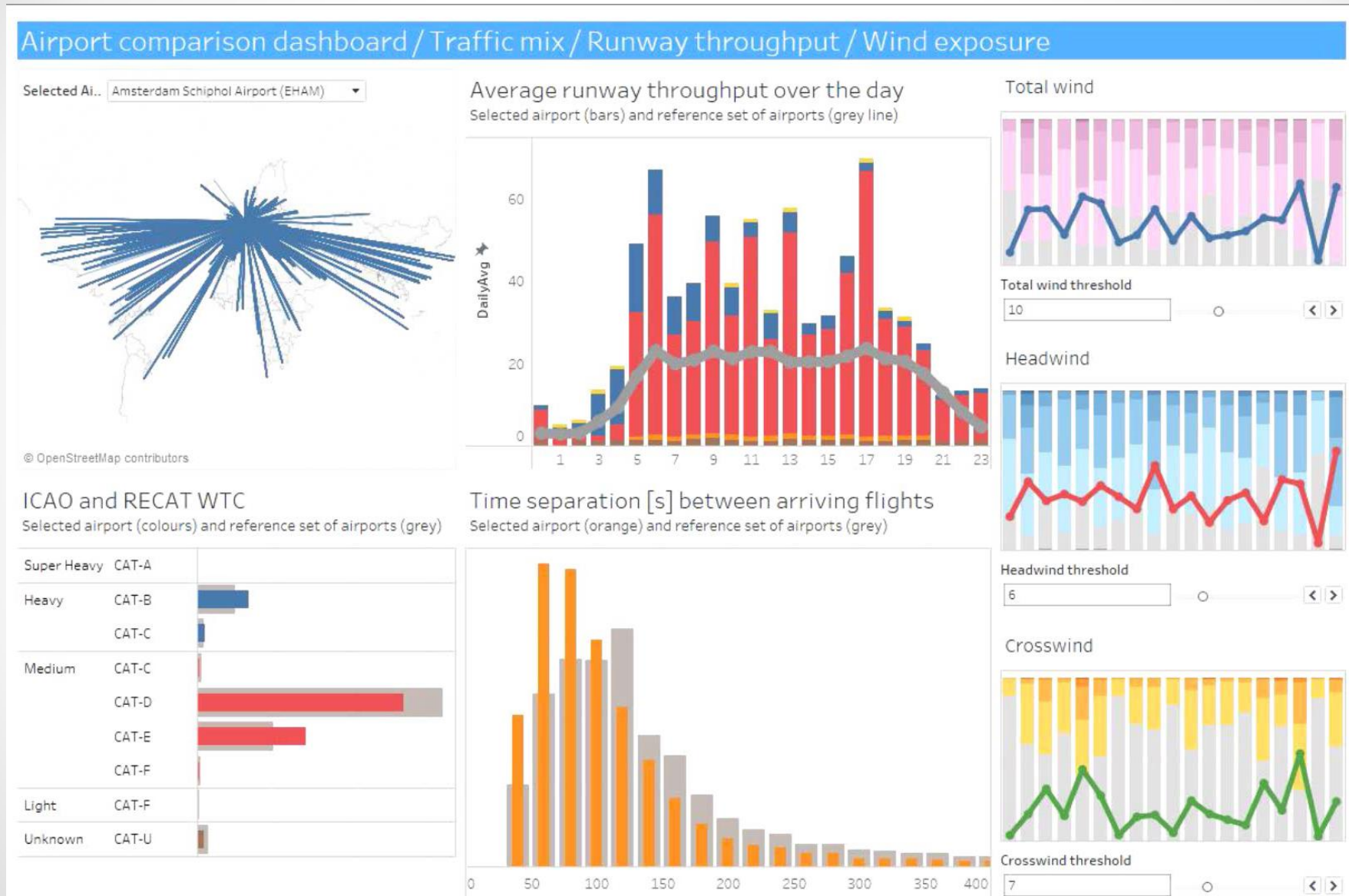


Tests on SURFsara Hadoop cluster / SPARK

- Scaling in volume: longer time periods
- Scaling in variety: more airports
- Including shared data

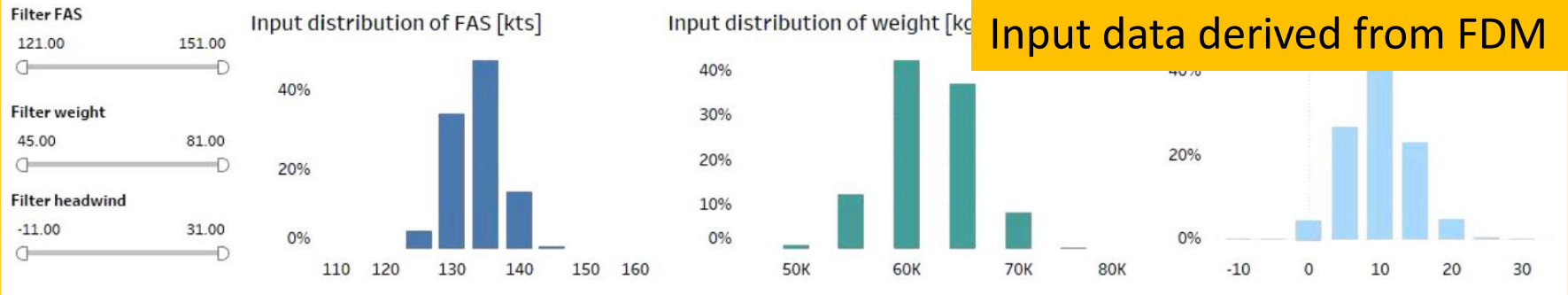


Analysis + visualisation of exposure data

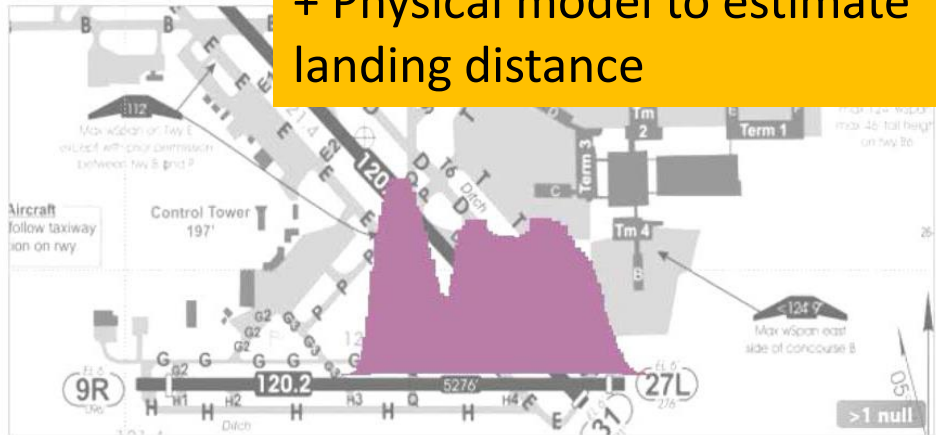


Prediction of risk indicators

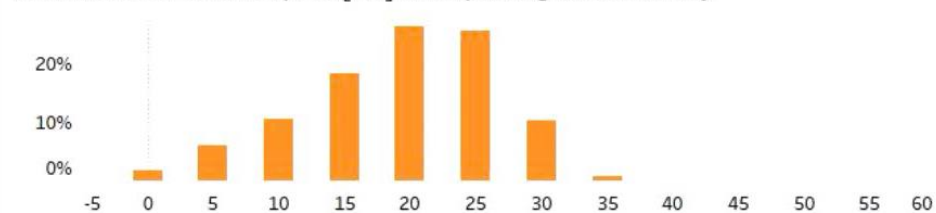
Landing distance model



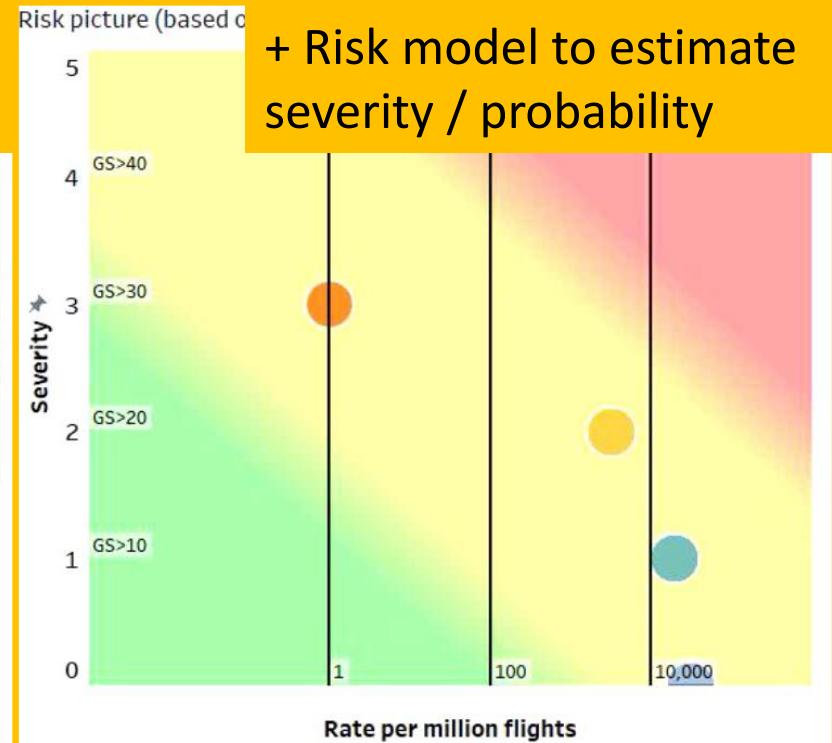
+ Physical model to estimate landing distance



Distribution of Ground Speed [kts] when passing end of runway



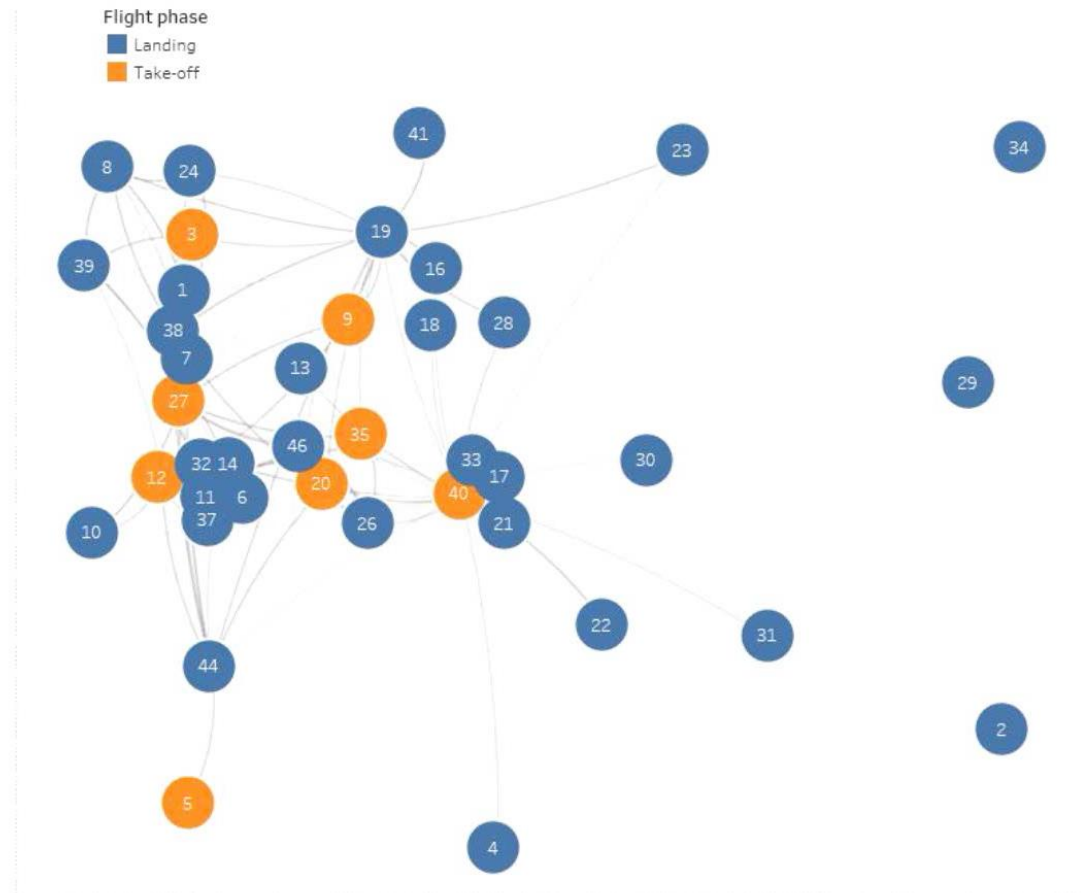
+ Risk model to estimate severity / probability



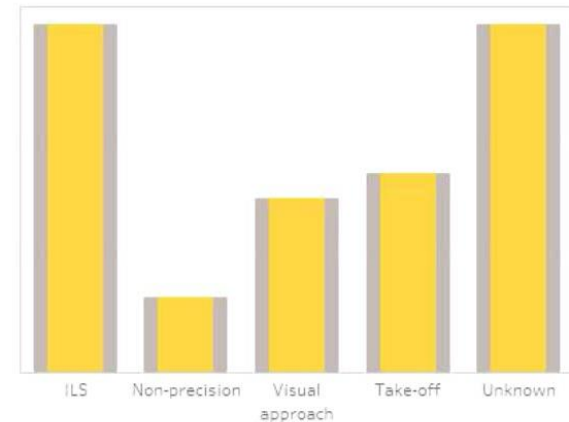
Text and data mining of occurrence reports

Analysis of structured and unstructured information in occurrence reports

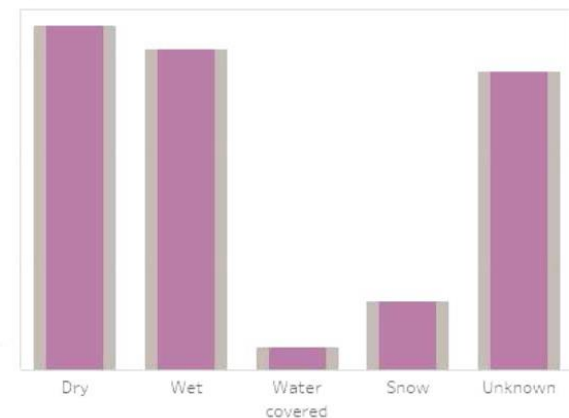
Similarity of narratives in occurrence reports



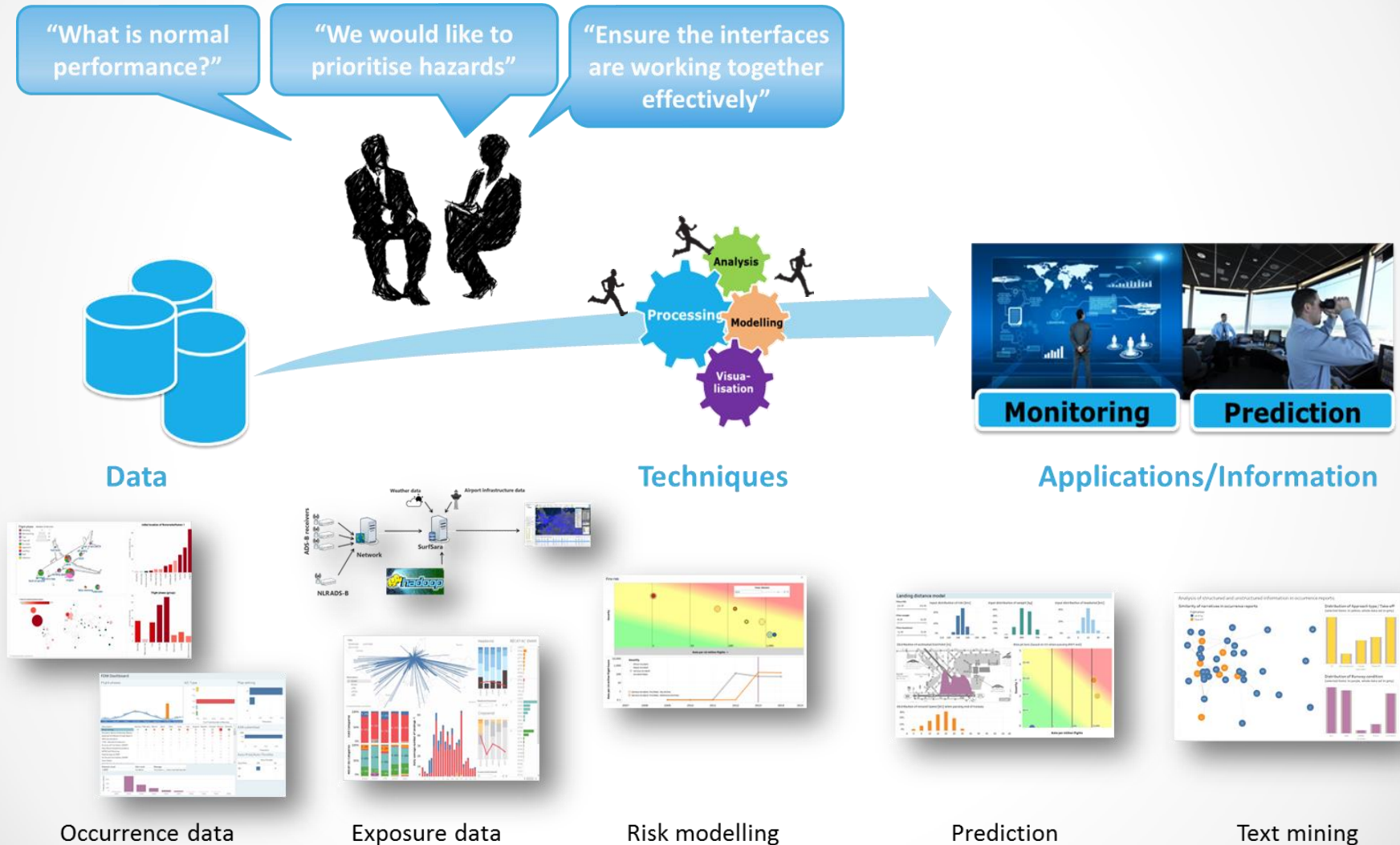
Distribution of Approach type / Take-off (selected items in yellow, whole data set in grey)



Distribution of Runway condition (selected items in purple, whole data set in grey)



In summary





Consortium

Stichting Nationaal Lucht- en Ruimtevaartlaboratorium
Deutsches Zentrum für Luft- und Raumfahrt
Office national d'études et de recherches aérospatiales
Centro para a Excelência e Inovação na Indústria Automóvel
Centro Italiano Ricerche Aerospaziali
Centre Suisse d'Electronique et Microtechnique SA
Institutul National de Cercetari Aerospatiale "Elie Carafoli"
Instituto Nacional de Técnica Aeroespacial
Výzkumný a zkušební letecký ústav, a.s.
Totalförsvarets Forskningsinstitut
European Organisation for the Safety of Air Navigation

Civil Aviation Authority UK
Airbus SAS
Airbus Operations SAS
Airbus Defence and Space
Thales Avionics SAS
Thales Air Systems SA
Deep Blue SRL
Technische Universität München
Deutsche Lufthansa Aktiengesellschaft
Service Technique de l'Aviation Civile
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Sistemi Innovativi per il Controllo del Traffico Aereo

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